PTO/SB/08A (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	10/820,864
Filing Date	April 9, 2004
First Named Inventor	Garg, et al.
Art Unit	1762
Examiner Name	
Attorney Docket Number	06357P USA

Sheet 1 of 2

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
/BC/		US- 5,521,120	05-28-1996	Nulman, et al.	
/BC/		US- 6,423,201 B1	07-23-2002	Mandrekar	
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
/BC/		60258471	12-20-1985	Shiotani Yoshimi	(Abstract)	
		WO 00/71550 A1	11-30-2000	Xu, et al.		
		EP 1 142 894 A2	10-10-2001	Morman, et al.		
		EP 1 029 943 A1	08-23-2000	Harada		
/BC/		EP 0 818 559 A2	01-14-1998	Danek, et al.		

Examiner Signature	/Bret Chen/	Date Considered	11/26/2007

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformation and not considered. Include copy of this form with next communication to applicant. [1]Applicant's unique citation designation number (optional). [2]See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

PTO/SB/08B (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	2	of	2

Complete if Known	
Application Number	10/820,864
Filing Date	April 4, 2004
First Named Inventor	Garg, et al.
Art Unit	1762
Examiner Name	
Attorney Docket Number	06357P USA

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
/BC/		MARCADAL, C., et al., "CVD Process for Copper Interconnection", Microelectronic Engineering 37/38 (1997), pp. 97-103	
		JOSWIG, H., et al., "Improved Performance of Tin-Diffusion Barriers After a Post-Treatment", VMIC Conference, June 12-13, 1990, p. 477	
		WANG, M. T., et al., "Barrier Properties of Very Thin Ta and TaN Layers Against Copper Diffusion", J. Electrochem. Soc., Vol. 145, No. 7, July 1998, pp. 2538-2545	
		ZHANG, JIMING, et al., "CVD Cu Process Development and Integration for Sub-0.18 μm Devices", Mt. Res. Soc. Symp. Proc., Vol. 564, 1999, pp 243-249	
/BC/		JAIN A., et al. "Process Development, Film Characterization, and Integration of PECVD W_2N as a Diffusion Barrier for Copper Interconnect", SANDHU, GURTEJ S., "Advanced Metallization Conference in 1998 (AMC 1998), Materials Research Society, pp. 305-311	

Examiner Signature	/Bret Chen/	Date Considered	11/26/2007

*EXAMINER: Initial if reference considered, whether or not citation is in conformation with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

PTO/SB/08A (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	1	of	3

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	**Diwakar Garg, et al.**
Art Unit	
Examiner Name	
Attorney Docket Number	**06357P USA**

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
/BC/		US- 5,019,531	5/28/1991	Nobuyoshi Awaya, et al.	
		US- 5,085,731	2/4/1992	J. A. T. Norman, et al.	
		US- 5,242,860	9/7/1993	J. Nulman, et al.	
		US- 5,434,044	7/18/1995	J. Nulman, et al.	
		US- 5,521,120	5/28/1996	J. Nulman, et al.	
		US- 6,165,555	12/26/2000	C. H. Jun, et al.	
/BC/		US- 6,423,201 B1	7/23/2002	T. Mandrekar	
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
/BC/		JP 2000219968 A		Japan		✓
		JP 96127870 A		Japan		✓
		WO 00/71550 A1		World		✓
/BC/		WO 99/00830		World		✓

Examiner Signature	/Bret Chen/	Date Considered	11/28/2007

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformation and not considered. Include copy of this form with next communication to applicant. [1]Applicant's unique citation designation number (optional). [2]See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

PTO/SB/08B (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	
				Filing Date	
				First Named Inventor	Diwaker Garg, et al.
(Use as many sheets as necessary)				Art Unit	
				Examiner Name	
Sheet	2	of	3	Attorney Docket Number	06357P USA

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T [2]
/BC/		E. T. Eisenbraun, et al., "Enhanced Growth of Device-Quality Copper by Hydrogen Plasma-Assisted Chemical Vapor Deposition," Appl. Phys. Lett. 60 (25), pp. 3126-3128 (1992).	✓
		H. J. Jin, et al., "Plasma-Enhanced Metal Organic Chemical Vapor Deposition of High Purity Copper Thin Films Using Plasma Reactor with the H Atom Source," J. Vac. Sci. Technol. A 17(3), pp. 726-730 (1999).	✓
		S. K. Lakshmanan, et al., "A Novel Model of Hydrogen Plasma Assisted Chemical Vapor Deposition of Copper," Thin Solid Films 338, pp. 24-39 (1999).	✓
		J. A. T. Norman, et al., "Chemical Additives for Improves Copper Chemical Vapor Deposition Processing," Thin Solid Films 262, pp. 46-51 (1995).	✓
		G. A. Petersen, et al., "Enhanced Chemical Vapor Deposition of Copper from (hfac)Cu(TMVS) Using Liquid Coinjection of TMVS," J. Electrochem Soc., Vol. 142, No. 3, pp. 939-944 (1995).	✓
		A. V. Gelatos, et al., "Chemical Vapor Deposition of Copper from Copper^{+1} Precursors in the Presence of Water Vapor," Appl. Phys. Lett. 63 (20), pp. 2842-2844 (1993).	✓
		S-W K., et al., "(hfac)Cu(I)(MP) (hfac=hexafluoroacetylacetonate, MP=4-methyl-l-pentene) and (hfac)(Cu(I)(DMB) (DMB=3,3-dimethyl-l-butene) for the Chemical Vapor Deposition of Copper Film," Thin Solid Films, pp. 10-13 (1999).	✓
		E. S. Hwang, et al., "Surfactant-Catalyzed Chemical Vapor Deposition of Copper Thin Films," Chem Mater. 12, pp. 2076-2081 (2000).	✓
		T. Nguyen, et al., "Stress and Adhesion of CVD Copper and Tin," Mat. Res. Soc. Symp. Proc. Vol. 356, pp. 859-862 (1995).	✓
		R. Kröger, et al., "Nucleation and Growth of CVD Cu Films," Mat. Res. Soc. Symp. Proc. Vol. 564, pp. 237-241 (1999).	✓
		R. Kröger, et al., "Properties of Copper Films Prepared by Chemical Vapor Deposition for Advanced Metallization of Microelectronic Devices," Journal of The Electrochemical Society, 146 (9), pp. 3248-3254 (1999).	✓
		M. Juppo, et al., "Deposition of Copper Films by an Alternate Supply of CuCl and Zn," J. Vac. Sci. Technol. A 15(4), pp. 2330-2333 (1997).	✓
		P. Martensson, et al., "Atomic Layer Epitaxy of Copper," J. Electrochem. Soc., Vol. 145, No. 8, pp. 2926-2931 (1998).	✓
		R. Solanki, et al., "Atomic Layer Deposition of Copper Seed Layers," Electrochemical and Solid-State Letters, 3(10), pp. 479-480 (2000).	✓
		K. Holloway, et al., "Tantalum as a Diffusion Barrier Between Copper and Silicon: Failure Mechanism and Effect of Nitrogen Additions," J. Appl. Phys. 71 (11), pp. 5433-5444 (1992).	✓
		M. H. Tsai, et al., "Comparison of the Diffusion Barrier Properties of Chemical-Vapor-Deposited TaN and Sputtered TaN between Cu and Si," J. Appl. Phys. 79 (9), pp. 6932-6938 (1996).	✓
/BC/		B. Mehrotra, et al., "Properties of Direct Current Magnetron Reactively Sputtered TaN,"	✓

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
/BC/		J. Vac. Sci. Technol. B5 (6), pp. 1736-1740 (1987).	
		M. J. Buiting, et al., "Kinetical Aspects of the LPCVD of Titanium Nitride from Titanium Tetrachloride and Ammonia," J. Electrochem. Soc., Vol. 138, No. 2, pp. 500-505 (1991).	✓
		B. H. Weiller, "CVD of Titanium Nitride for Electronic Applications: Gas Phase Chemical Kinetics for Fundamental Principles and Modeling," Electrochemical Society Proceedings, Vol. 96(5), pp. 231-238.	✓
		T. Q. Li, et al., "Initial Growth and Texture Formation During Reactive Magnetron Sputtering of TiN on Si(111)," J. Vac. Sci. Technol. A 20(3), pp. 583-588 (2002).	✓
		G. S. Chen, et al., "Evaluation of Radio-Frequency Sputter-Deposited Textured TiN Thin Films as Diffusion Barriers Between Copper and Silicon," J. Vac. Sci. Technol A 20(2), pp. 479-485 (2002).	✓
/BC/		A. Bouteville, et al., "Low Temperature Rapid Thermal Low Pressure Chemical Vapor Deposition of (111) Oriented TiN Layers from the $TiCl_4$-NH_3-H_2 Gaseous Phase," Microelectronic Engineering 37/38, pp. 421-425 (1997).	✓

Examiner Signature	/Bret Chen/	Date Considered	11/28/2007

*EXAMINER: Initial if reference considered, whether or not citation is in conformation with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.